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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,451	12/03/2003	Peter J. Hopper	100-18010 (P05268-D01)	7097

33402 7590 05/20/2004

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EXAMINER

NGUYEN, HA T

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 05/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/727,451

Applicant(s)

HOPPER ET AL.

Examiner

Ha T. Nguyen

Art Unit

2812

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 14-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12-3-3 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date: \_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 15 recites the limitation "second etching" in line 1. There is insufficient antecedent basis for this limitation in the claim.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 14-15, 21, 22, and 24 are rejected under 35 U.S.C. 102(e) as being anticipated by Yang et al. (USPN 6495469, hereinafter "Yang").

Referring to Figs. 1-5 and related text, Yang discloses [Re Claims 14, 21, and 22] a method of forming a semiconductor device, the method comprising the steps of: forming a layer of insulation material 14,18 over a semiconductor substrate 10, the layer of insulation material having a top surface; etching the layer of insulation material to form a plurality of first trenches 30 in the layer of insulation material, each first trench having a first bottom surface (bottom of via 30) vertically spaced a first distance apart from the top surface (see Fig. 2); and etching the layer of insulation material and the plurality of first trenches to form a second trench 34 in the layer of insulation material, the second trench having a plurality of second bottom surfaces 36 vertically spaced a second distance apart from the top surface, and third bottom surfaces (bottom of vias 30') vertically spaced a third distance apart from the top surface, the third bottom surfaces lying below the second bottom surfaces;

[Re Claims 15 and 24] wherein the step of etching the layer of insulation material and the plurality of first trenches includes the steps of: forming a patterned mask 26 to expose a portion of the top surface of the layer of insulation material and the plurality of first trenches, it is inherent that the steps of forming a layer of masking material on the layer of insulation material and patterning the layer of masking material are performed; and anisotropically etching the layer of insulation material and the plurality of first trenches to form the second trench 34 (see Figs. 4 and 5).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103<sup>(a)</sup> and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 16, 18-19, 23, and 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Chittipeddi et al. (USPN 6417087, hereinafter "Chittipeddi").

[Re Claims 16 and 23] Yang also discloses further comprising the steps of: forming a layer of conductive material on the layer of insulation material to fill up the second trench; and planarizing the layer of conductive material to form a conductive region (see col. 4, lines 4-14). But it does not disclose expressly the conductive region having a top surface that is substantially planar with the top surface of the layer of insulation material. However, the missing limitation is

Art Unit: 2812

well known in the art because Chittipeddi discloses this feature (See Fig. 2). A person of ordinary skill is motivated to modify Yang with Chittipeddi to obtain planarized device with no conductive material on the top surface of the insulation material preventing short circuit.

[Re Claims 18-19 and 27-28] Yang also discloses wherein the conductive region is connected to a contact; wherein the conductive region is connected to a via (see col. 2, lines 35-39).

6. Claims 20 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Chittipeddi, as applied to above, and further in view of Braeckelmann et al. (USPN 6218302, hereinafter "Braeckelmann").

The combined teaching of Yang and Chittipeddi discloses substantially the limitations of claims 20 and 29, as shown above. Yang also discloses a layer of seed material formed on the layer of insulating material; and a layer of formed on the layer of seed material (see col. 4, lines 4-14).

But it does not disclose expressly the metal is copper and a barrier layer is formed underlying the seed layer.

However, the missing limitation is well known in the art because Braeckelmann discloses these features (See abstract).

A person of ordinary skill is motivated to modify Yang and Chittipeddi with Braeckelmann to obtain contact of lower resistivity.

7. Claims 17, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Chittipeddi, as applied to above, and further in view of Katoh (USPN 5986346).

The combined teaching of Yang and Chittipeddi discloses substantially the limitations of claims 17, 25 and 26, as shown above.

But it does not disclose expressly wherein the conductive region is formed to have a number of loops; wherein the loops lie substantially in a same plane.

However, the missing limitation is well known in the art because Katoh discloses these features (See Fig. 6(a)).

Art Unit: 2812

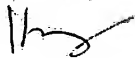
A person of ordinary skill is motivated to modify Yang and Chittipeddi with Katoh to obtain protection against propagation of cracks .

*Conclusion*

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha Nguyen whose telephone number is (571) 272-1678. The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Neibling, can be reached on (571) 272-1679. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Ha Nguyen .

Primary Examiner

05- 14- 04